REMARKS

Responsive to the outstanding Office Action, applicant has carefully studied the Examiner's rejections and the comments relative thereto. Favorable reconsideration of the application is respectfully requested in light of the amendments and following detailed arguments. It is respectfully submitted that no new matter has been entered.

In this response claim 14 has been amended to correct an error previously entered, wherein the term "chemical was erroneously entered in place of "cathode". The language has been correctly restored to that originally presented. Additionally, claim 14 has been amended to remove the necessity of hydrogen from being in the mixture. It is respectfully submitted that no new matter was presented in this amendment as the change merely reinstates language that was previously present.

Claims 14-26 and 29 are rejected under 35 U.S.C. 103 as being unpatentable over DE 43 05 414 A1 to Wandke in view of US Patent No. 6,277,523 to Giron. In this respect, the Examiner states that Wandke teaches coating a substrate with a metal oxide layer, especially a stannic oxide layer, in a vacuum in which a corresponding metal target is inserted into a corresponding chamber and eroded, and this erosion coats the substrate, whereby an oxygen-containing plasma arising from a corresponding basic gas mixture is created in the area between the target and substrate. Further, referring to page 1 of the Wandke translation, the Examiner indicates that the disadvantage of this process, namely that the oxidizing atmosphere also affects the target, and the target surface becomes increasingly coated with oxide which negatively influences the overall procedure as, e.g. the coating rate decreases, is solved by using a balanced oxidizing and reducing basic gas mixture consisting of at least 20 percent by volume oxygen, hydrogen and a gaseous hydrocarbon or halogenated hydrocarbon in the coating procedure. This mixture may also contain 5-40 percent by volume argon.

The Examiner notes that Wandke differs from the present claims in that the hydrocarbon being saturated is not discussed, the volumetric ratio of added hydrocarbon to added oxygen is not discussed, the volumetric ratio of added noble gas to oxygen is not discussed, the tin oxide

layer being electrochromic is not discussed, the target being tungsten is not discussed, the target containing molydenum, titanium, cerium, vanadium and/or zirconium is not discussed, and the thickness of the electrochromic layer is not discussed. In this respect, the Examiner takes the position that Giron teaches an inhibited electrochromic layer of WO_3, Nb_2O_3, SnO_2, Bi_2O_3, TiO_2,V_2O_5, hydrogenated nickel oxide or MoO_3 material which exists in a decolored or only slightly colored state, and that all the oxide-based layers are obtained by this technique using a metal target, but in a reactive atmosphere containing oxygen. Continuing, the Examiner states that since Giron teach utilizing a metal target to deposit the corresponding metal oxide it would be obvious to utilize targets containing tungsten, molybdenum, titanium, cerium, vanadium and/or zirconium. The Examiner notes that the motivation for depositing electrochromic layers using targets of metals for depositing the particular compositions of the layers in particular atmospheres at particular thicknesses by sputtering is that it allows for simplifying the method of manufacturing of the electrochromic devices. The Examiner thus states that it would have been obvious for one skilled in the art at the time the invention was made to have modified Wandke by depositing electrochromic layers utilizing targets of metals for depositing the particular compositions of the layers in particular atmospheres at particular thicknesses by sputtering as taught by Giron.

The Examiner also rejects claims 14-26 and 29 as being rejected under 35 USC §103 as being unpatentable over Giron in view of Wandke. The Examiner opines that the difference between Giron and the present claims is the utilization of gaseous hydrocarbons for sputtering. Also, the hydrocarbon being saturated is not discussed; the saturated hydrocarbon being one of methane, ethane, propane or butane is not discussed; the volumetric ratio of added noble gas to oxygen is not discussed and the total pressure is not discussed.

Before discussing the prior art in detail, applicants would like to review the invention as disclosed in independent claim 14. Claim 14 discloses a process for the production of an electrochromic coating on a substrate by cathode sputtering of a target. The target consists of tungsten or a tungsten alloy or contains at least one of molybdenum, titanium, cerium, vanadium and zirconium. The coating atmosphere contains a noble gas. At least one gaseous hydrocarbon is added to the coating atmosphere.

It is respectfully submitted that the Wandke reference teaches the use of a specific gas mixture when sputter coating metal targets to reactively deposit metal oxide coatings. Claim 1 of Wandke generally refers to the sputter coating of metal oxides, however, the only detailed description shown in the reference is for the sputter deposition of tin oxide from tin targets. It is respectfully submitted that this reference in no way enables one skilled in the art to foresee the deposition of metal oxides other than tin oxide. This lack of disclosure precludes one skilled in the art from applying this process to other metals. Further, the issues addressed by the Wandke reference specifically apply to the deposition of a tin coating, and the teaching of Wandke is specifically devoted to this particular issue. Even if this issue was present in materials other than tin, it is not obvious to one skilled in the art that the approach used in Wandke for tin would be applicable for any other materials.

An additional distinction between the present invention and Wandke is that Wandke teaches the use of at least three gases, all in relatively high amounts. Wandke requires at least 20% by volume oxygen, at least 20% by volume hydrogen, and at least 20% by volume hydrocarbon or halogenated hydrocarbon. This differs from the present invention, which **does not** teach or use hydrogen in gaseous (molecular) form, but instead utilizes an atmosphere that contains **hydrogen ions**. As the presence of neither hydrogen gas nor molecular hydrogen is required for the present invention, the inclusion of hydrogen ions has been deleted from the claims. It is not an essential, or even a preferred feature of the present invention to utilize molecular hydrogen in the coating gas mixture as is done in Wandke.

Further, as claimed in claim 14, the atmosphere contains a noble gas and the addition of a gaseous hydrocarbon. The atmosphere taught therein is not suitable for the materials taught in Wandke, and it is therefore submitted that the application of Wandke against claim 14 is not obvious.

Applicants continue to maintain that the present invention is strictly related to, and limited to, processes for the production of electrochromic coatings and does not relate to the general deposition of metal oxide coatings. The issues addressed herein are directly related to the problems incurred in the production of electrochromic layers.

As discussed previously, Wandke does not relate to electrochromic coatings, since Wandke refers to sputtering tin oxide, with is not a typical electrochromic material. Especially, for electrochromic elements using lithium ions as charge carriers, tin oxide is unsuitable as an electrochromic coating.

The present invention aims at improving the process for producing electrochromic coatings. The problem which is to be solved by the present invention is to improve a process called conditioning, to which electrochromic coatings have to be subjected before they have a sufficiently high reversible storage capacity for ions which makes them suitable for use in electrochromic pane arrangements. The applicants have surprisingly found that a process for producing electrochromic coatings by sputtering in an atmosphere containing a noble gas and hydrocarbon along with oxygen, produces electrochromic coatings having a significantly reduced blind charge. This can be seen in Examples 1 to 4, summarized in Table 1. The effect of the blind charge thus reduced is that the electrochromic coatings which are a product of the inventive production process herein claimed, show a higher coloring efficiency.

The Wandke reference is directed to a method of coating a substrate with a metal oxide layer, specifically a stannic oxide layer in a vacuum. The Examiner has previously noted that Giron teaches that stannic oxide is an electrochromic material. Applicants continue to assert that, as shown in column 4, lines 22-44, stannic oxide is shown as a *potential* electrochromic material where the device operates by the reversible insertion of H^+ ions. The following paragraph notes that where the device operates by the insertion of Li^+ ions, suggested materials do not include stannic oxide. Applicants assert that, as noted previously, stannic oxide is not a suitable electrochromic material where lithium ions are to utilized.

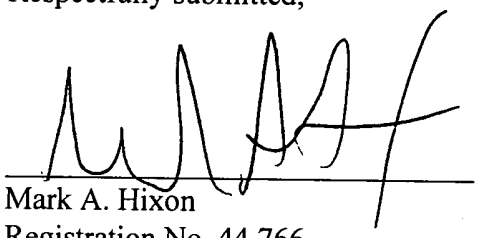
With regard to the Giron reference, this reference teaches the use of either hydrogen gas or water vapor as a source of the hydrogen ions needed to provide the coatings with an electrochromic function. As Wandke was not directed to the formation of electrochromic coatings, but merely tin oxide coatings, there is no reason why one skilled in the art would look to the deposition of an electrochromic coating, such as found in Giron, for inclusion in the non-electrochromic coating process of Wandke.

In like manner, one skilled in the art would be even less inclined to utilize the atmosphere of Wandke in the electrochromic process of Giron, thus utilizing noble gas plus a hydrocarbon in lieu of hydrogen gas or water vapor required by Giron. One skilled in the art would not be motivated to combine the references in this manner, as he would be inclined to fear the loss or degradation of electrochromic properties from this atmosphere.

In view of the above, it is respectfully submitted that it is improper to combine either the Wandke reference with the Giron reference, or the Giron reference with the Wandke reference. It is therefore submitted that claim 14 is allowable over the applied art of record. The remaining claims, which depend directly or indirectly from claim 14, are believed allowable based, at least, upon this dependence.

Should the Examiner wish to modify any of the language of the claims, applicants' attorney suggests a telephone interview in order to expedite the prosecution of the application.

Respectfully submitted,



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